ABSTRACT

Detection of phenols using engineered bacteria. A biosensor can be created by placing a reporter gene under control of an inducible promoter. The reporter gene produces a signal when a cognate transcriptional activator senses the inducing chemical. Creation of bacterial biosensors is currently restricted by limited knowledge of the genetic systems of bacteria that catabolize xenobiotics. By using mutagenic PCR to change the chemical specificity of the Pseudomonas species CF600 DmpR protein, the potential for engineering novel biosensors for detection of phenols has been demonstrated. DmpR, a well-characterized transcriptional activator of the P. CF600's *dmp* operon mediates growth on simple phenols. Transcription from *Po*, the promoter heading the *dmp* operon, is activated when the sensor domain of DmpR interacts with phenol and mono-substituted phenols. By altering the sensor domain of the DmpR, a group of DmpR derivatives that activate transcription of a *Po-lacZ* fusion in response to eight of the EPA's eleven priority pollutant phenols has been created. The assays and the sensor domain mutations that alter the chemical specificity of DmpR is described.